P031 Biomineralization and biomimetic mineralization using the Dps family cage architectures

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Biomolecules are increasingly being used as templates in synthetic materials formation. Biological control over the formation of inorganic minerals results in the formation of exquisite 'biomineral' structures such as teeth, bones, and seashells whose formation are mediated at the molecular level by interactions with organic macromolecules. In order to achieve the elegant control over the formation of synthetic inorganic materials it is necessary to understand as much about the biological processes as possible, rather than merely mimic the end result.
A recently identified family of proteins, that catalyze the biomineralization of 'nanoparticles' of iron oxide as part of an oxidative stress response in Prokaryotes, are the focus of this research field. These are the Dps (DNA binding proteins from nutrient starved cells) proteins, which have been structurally characterized and in one example Fe-oxide clusters of seven iron atoms have been observed and characterized within atomic resolution. An effort to achieve a thorough understanding of the structural basis for iron biomineralization will underlie the synthetic efforts to use Dps proteins as size constrained templates for synthetic nanoparticle fabrication.